Space, Time, and Relativity

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Theosophical relativity

Space is commonly thought of as being absolute emptiness or nothingness. However, if space were sheer nothingness, it would not exist, and nothing could be located in it or move through it. Logically, space must have some kind of structure and therefore consist of substance, and unless this substance is assigned impossible, abstract properties (such as absolute continuity and homogeneity), space must consist of infinite interpenetrating grades of energy-substance. What to us is 'empty' space is simply those regions of space containing no matter perceptible to our physical senses.

In theosophy, a distinction is drawn between abstract space and concrete space.[1] Abstract space is the boundless All, the omnipresent divine essence, unfathomable and ineffable. It is universal consciousness, life, substance, force, energy – all of which are fundamentally one. Infinite space comprises a limitless number of concrete, finite spaces or spatial units, each of which is composed of smaller units and nested within a hierarchy of larger units. Hierarchical systems extend not only 'horizontally' (on the same plane), but also 'vertically' or inwardly (to higher and lower planes), for the one essence of consciousness-life-substance manifests in an infinite spectrum of vibration or density, forming an unending series of interpenetrating, interacting worlds within worlds, systems within systems.

On our own 'horizontal' level (the physical plane), for example, we find the following natural hierarchy, or order of increasing wholeness: subatomic particles, atoms, molecules, cells, organisms, ecosystems, planets, solar systems, galaxies, clusters, superclusters, etc. The multilevelled constitution of worlds and of the organisms that inhabit them form 'vertical' hierarchies, composed of several interpenetrating elements or aspects, from physical-astral to psychomental to spiritual-divine, each of which can be further divided. Since the universe is essentially a unity manifesting in endless diversity, spirit and matter are fundamentally one, and the most 'spiritual' pole of one hierarchy is the most 'material' pole of the next, superior hierarchy, just as the lowest pole of one hierarchy is the highest pole of the one below. 'Spirit' and 'matter' are therefore relative.

Although boundless space can be thought of as an empty container filled with beings and things, it would be more correct to say that the infinite totality of worlds within worlds, and the infinite multiplicity of living, substantial, conscious entities associated with them, actually *compose* space.[2] From this point of view, reality is a fullness or plenum. From another viewpoint, however, reality can be regarded as a void (or what buddhists call shunyata), for all the infinite planes that make up reality are invisible to us except our own material plane, which is itself only a transitory manifestation consisting mainly of empty space.[3]

What to us are invisible worlds are not strictly speaking extra 'dimensions'; all the substantial, concrete systems composing any particular world are extended in three spatial dimensions and no more. As H.P. Blavatsky says: 'popular common sense justly rebels against the idea that under any condition of things there can be more than three of such dimensions as length, breadth, and thickness'.[4] In its broadest sense, a 'dimension' is any measurable quantity, such as length, mass, temperature, or time. Strictly speaking, then, infinite space has no dimensions, 'spatial' or otherwise, for being an abstraction it is immeasurable; length, breadth, and thickness apply only to manifested entities, such as atoms, humans, and stars.[5]

The words 'plane' and 'subplane' denote particular ranges of vibration or density, and are relative terms. A plane can also be called a globe or sphere, since natural systems such as planets and stars tend to assume a more or less spherical shape. From one viewpoint, each of the visible planets and stars in the physical universe is a plane/subplane in its own right, floating in the intangible ether of space, whereas from another viewpoint, they all belong to the same (physical) plane, since they are all composed of matter of more or less the same grade, and such matter is also sparsely scattered throughout the 'empty' space between them.

Our physical globe appears to us to be a continuous, solid object. It is built up of 'discontinuities' (atoms), which are separated by empty space (ethereal matter) and consist of smaller 'discontinuities' (subatomic particles), which in turn are separated by empty space and are further divisible. Every relative discontinuity (e.g. star, planet, atom, subatomic particle) is a relatively continuous whole, resolvable into finer discontinuities or subwholes, and forming part of larger wholes, which at some level appear to be relatively continuous. And every such whole or subwhole can be regarded as a globe, sphere, or plane.

Just as boundless space comprises endless finite units of space, so eternal duration comprises endless finite units of time. Time is a concept we use to quantify the rate at which events occur; it is a function of change and motion, and presupposes a succession of cause and effect. Every entity is extended in space and changes 'in time'. From this perspective, nothing can exist absolutely 'beyond' space and time, though the subjective experience of space and time can vary immensely, according to mood, state of consciousness, and stage of evolution.

Time is sometimes said in theosophy to be an 'eternal now', but this is not intended to deny the existence of a sequence of cause and effect. Everything that is actually happening is happening *now*, in the *universal* and – in a sense – *eternal* present. Although the past is by definition that which has already happened, and the future is that which has not yet happened, both are alive in the present, for the present is the child of the past and the parent of the future.

How long does the 'present moment' last? In the case of humans, it has been found that sound pulses separated by more than 3 seconds can no longer be grouped into pairs because they fall outside the span of attention. This represents the maximum interval of

time that is simultaneously present for subjective evaluation – a kind of attention span bridging past and future events.

> How finely can we divide our little 3-second lives? The shortest perceivable time division – sensory psychologists call it the *fusion threshold* – is between 2 and 30 milliseconds (ms) depending on sensory modality. Two sounds seem to fuse into one acoustic sensation if they are separated by less than 2 to 5 milliseconds. Two successive touches merge if they occur within about 10 milliseconds of one another, while flashes of light blur together if they are separated by less than about 20 to 30 milliseconds.[6]

In principle, time intervals can of course be subdivided further. Some theorists claim that the smallest possible unit of time is 10^{-43} seconds, and the smallest unit of distance 10^{-33} cm, but these are merely limits based on speculative theorizing. If entities can exist in an infinite range of sizes, then units of time and distance must similarly span an infinite range. Distance and time are therefore relative: an atom is like a miniature solar system, reembodying perhaps millions of times in what for us is one second, and our whole galaxy may be a molecule in some supercosmic entity, for which a million of our years is just a second. At an abstract level, the present instant for an infinitesimal entity would be infinitesimal, while for boundless space it would be eternal duration. Between these two abstract limits lies all the infinite diversity of the relatively real world, which consists of finite, concrete entities for which the present moment is always finite.

The theosophical doctrine of relativity is clearly of immense scope. The infinite divine essence of consciousness-life-substance manifests in an endless variety of forms, on an endless variety of scales, and in infinitely varying degrees of ethereality or substantiality. Infinitude is an abstraction, not an entity, and it therefore does not act or change and has no attributes. All the multitudes of finite, concrete, 'manifested' systems of which it is composed, on the other hand, move and change, act and react, and possess attributes. They are composite, inhomogeneous, and ultimately transient. Nothing is absolutely independent of or separate from other things; everything is interconnected and interdependent, and participates in an intricate, vibrant web of causal interactions. Every concrete world or entity passes through never-ending cycles of embodiment and disembodiment, activity and rest. There are no absolute beginnings or ends to evolution, only relative starting places and stopping or resting places.

The doctrine of relativity can also be called the doctrine of illusion (mâyâ). H.P. Blavatsky writes: 'Maya or illusion is an element which enters into all finite things, for everything that exists has only a relative, not an absolute, reality, since the appearance which the hidden noumenon assumes for any observer depends upon his power of cognition.'[7] In other words, all finite, manifested things and entities are illusory in the sense that they are impermanent and we do not perceive them as they really are; we see only the outer appearance displayed to us by our imperfect senses, and not the invisible processes going on behind. Apparent stability and invariance at one level, for example, is only temporary and relative, an illusion generated by unceasing flux at some deeper level. And what to us are 'elementary' particles are, on their own level, worlds no less complex than our own earth. All pairs of opposites – light and dark, big and small, hot and cold, harmony and disharmony, simplicity and complexity, etc. – have only a relative, never an absolute meaning.

Manifested things and entities, with their evanescent, ever-changing forms, are 'illusory' when compared with the immutability of infinitude, and also when compared with the *relative* immutability of what to any family of entities are the higher, 'spiritual', relatively 'nonmanifested' realms. The (collective) spiritual entity forming the summit of any hierarchy – whether atomic, human, planetary, solar, galactic, etc. – is the 'absolute' of that hierarchy. Since infinity – symbolized by a circle or zero – contains an infinite number of absolutes or 'ones', all absolutes are relative.[8] (Although infinity is sometimes referred to as 'the absolute', this is strictly speaking incorrect, for the word is derived from the Latin *absolutus*, meaning 'freed', 'unloosed', i.e. 'completed', 'perfected'; only something that evolves can become freed or perfected, and only a finite, conditioned entity can evolve.[9])

Theosophy teaches that:

> Relativity – which means universally occurring relationships in space and time – is the very heart of the conception of the kosmos as an aggregate of evolving entities, the offspring of infinite motion, infinite life, infinite progress always.[10]

> Everything is relative; there are no absolutes anywhere, except relatively so; there are no jumping-off places, there are no ultimates; there are no bounds beyond which the evolving spirit may not go. Everything is related to everything else.[11]

But behind the unending diversity and multiplicity of manifested beings and things lies the unitary divine essence of infinite consciousness-life-substance.

We shall now take a look at some of the bizarre ideas on space and time to be found in big bang cosmology and Einsteinian relativity theory.

References

1. See G. de Purucker, *Fountain-Source of Occultism*, TUP, 1974, pp. 74-8.
2. See G. de Purucker, *Occult Glossary*, TUP, 2nd ed., 1996, pp. 165-6.
3. See *Fountain-Source of Occultism*, pp. 65-9.
4. H.P. Blavatsky, *The Secret Doctrine*, TUP, 1977 (1888), 1:252.
5. *Fountain-Source of Occultism*, pp. 79-80; G. de Purucker, *Esoteric Teachings*, PLP, 1987, 3:30-1.
6. Nick Herbert, *Elemental Mind*, Dutton, 1993, p. 50.
7. *The Secret Doctrine*, 1:39, 295-6.
8. See *Occult Glossary*, pp. 147-8.
9. See ibid., pp. 1-2; G. de Purucker, *Studies in Occult Philosophy*, TUP, 1945, pp. 463-4, 498-9, 517-22.
10. G. de Purucker, *Fundamentals of the Esoteric Philosophy*, TUP, 2nd ed., 1979, p. 241.
11. Ibid., pp. 425-6.

Big bang fantasies

Logic and common sense dictate that nothing can come from nothing, and that nothing can be annihilated into nothing; energy-

substance can only be transformed. Furthermore, nothing finite can become infinite or infinitesimal, and nothing infinite or infinitesimal can become finite. Space is infinite if the multitudes of finite, concrete systems within it, and in fact composing it, continue without limits in all directions. If space is infinite, it must always have been infinite and must always have existed. If space is not infinite, then it must be finite, but if this is the case where are the boundaries and what lies beyond them?

The only way to evade this question is to claim that space curves round upon itself so that it is finite and yet has no boundaries. Three-dimensional space could certainly be curved round upon itself if there was a fourth dimension for it to curve in – but there is no evidence of such an extra dimension. Big bang theorists claim that if there is enough matter in the universe, space curves round upon itself in just *three* dimensions so that it is finite and closed. However, to get space to perform this remarkable contortion, advanced mathematical acrobatics are required!

The standard big bang model claims that the whole universe – not only matter and energy, but also space and time – exploded into being out of 'literally nothing' some 10 to 15 billion years ago as the result of a random quantum fluctuation. Paul Davies and John Gribbin write: 'the big bang was the abrupt creation of the Universe from literally nothing: no space, no time, no matter.'[1] But if there was no space, matter, or energy before the hypothetical big bang, there was obviously nothing to undergo a fluctuation and nowhere for it to occur! However, big bangers have long since abandoned ordinary rules of logic and have created a fantasy world of their own. Nick Herbert, for example, writes: 'the production of our Universe . . . took place in an arena not only empty of light and matter, but devoid of space and time as well.'[2] Such an 'arena' certainly sounds like a very remarkable place!

To avoid the illogical idea that the universe emerged from an infinitesimal point, or 'singularity', of infinite density and temperature, big bangers have invented the equally far-fetched notion of a 'smeared-out singularity'. They claim that prior to 10^{-43} seconds after the big bang, when the universe measured just 10^{-33} cm across, the distinction between space and time becomes blurred (!) as a result of 'quantum fluctuations', so that an infinitesimal point can never form and the origin of the universe cannot be said to occur at a precise moment but is smeared out.

Since the hypothetical big bang, the universe has supposedly been expanding – into nothing. The dominant big bang model does not state that galaxies are moving apart *through* space, but that space itself is expanding – i.e. continuously being created out of nothing. Dean Turner comments: 'No one can imagine a state of spacelessness out of which space is somehow being created. How long shall we have to live with such silly flapdoodle in physics and cosmology?'[3] The 'open universe' scenario claims that although space popped into existence a finite period ago and expands at a finite pace, it somehow, and probably instantly, became infinite – and yet even though it is infinite it still manages to keep on expanding! Big bangers believe that the universe may at some point in the future start to contract, and end its life in a 'big crunch' in which it 'plunges into annihilation, leaving nothing. And "nothing" here means, literally, nothing – no space, no time, no matter.'[4] In centuries to come it may be difficult to understand how such half-baked ideas could ever have been passed off as 'science'![5]

The big bang theory is based on the Friedmann models – relatively simple solutions of Einstein's general theory of relativity that seek to describe the dynamic behaviour of the universe as a whole. They are based on the cosmological principle, which states that the universe is broadly the same in every place and in every direction. However, this principle has been severely challenged by the discovery of ever-larger structures, which suggest that the universe is not uniform and homogenous at all, but has a never-ending hierarchical structure – galaxies, galaxy clusters, superclusters, supercluster complexes, etc. etc.

According to theosophy, nature is infinite in space and time – limitless, beginningless, and endless. Within the boundless immensity of space, countless worlds, on every conceivable scale, populated and in fact composed of living, evolving entities at different stages of development, are constantly appearing and disappearing like 'sparks of eternity', passing through their cycles of life and death, birth and rebirth. Two objections that are sometimes raised to the idea of an eternal, infinite universe are Olbers' paradox and the second law of thermodynamics.

Olbers' paradox poses the question: Why is the night sky almost entirely dark? It is argued that if the universe is infinite and eternal and contains an infinite number of stars, the whole of the night sky ought to be ablaze with light. This argument ignores the obvious fact (denied by orthodox science) that light must lose energy as it travels through space, so that light from stars beyond a certain distance would never reach us in a visible form.

The second law of thermodynamics states that closed systems tend to evolve towards a state of maximum entropy or 'disorder', in which energy is dissipated in a uniform and useless form. From this it is deduced that the universe is 'running down'. In reality, however, there is no such thing as an absolutely 'closed' system in nature: there is a constant circulation of energies through the multitudes of systems that make up reality. To explain the contradictions of the second law – the very existence of the universe with its galaxies, stars, planets, and incredible diversity of lifeforms, etc. – some scientists resort to the contrived assumption that the decrease in entropy associated with the formation of, say, a star, is possible only because the entropy of the gravitational field *increases*. In other words, a smooth gravitational field is defined as low entropy while a smooth distribution of matter is defined as high entropy![6]

From a theosophical standpoint, the tendency for entropy to increase is only half a law: all the countless worlds in boundless space pass through regular cycles of formation and dissolution, materialization and etherealization, evolution and involution, activity and rest. There is not much danger of an infinite universe ever grinding to a complete halt!

References

1. Paul Davies & John Gribbin, *The Matter Myth*, Simon & Schuster/Touchstone, 1992, p. 122.
2. Nick Herbert, *Faster than Light*, Plume, 1988, p. 127.
3. R. Hazelett & D. Turner, *The Einstein Myth and the Ives Papers*, Devin-Adair Co., 1979, pt. 4, p. 263.
4. *The Matter Myth*, p. 175.
5. For further evidence against the big bang, see 'Cosmology and the big bang', davidpratt.info.
6. Eric J. Lerner, *The Big Bang Never Happened*, Vintage Books, 1992, pp. 288-9.

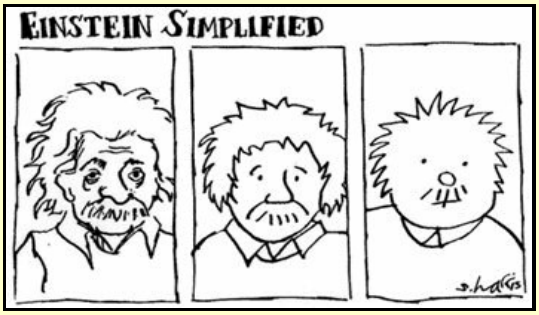
Einstein's fallacies

Einstein's relativity theory is a central plank of 20th-century science and is commonly said to have passed every experimental test with flying colours. However, there are plausible alternative explanations for all the experimental data and astronomical observations cited in support of the special and general theories of relativity, and the internal inconsistencies and unwarranted assumptions of standard relativity theory have been pointed out by dozens of scientists.

Pari Spolter writes: 'Many physicists who believe Einstein's theory of relativity to be flawed have not been able to get their papers accepted for publication in most scientific journals. Eminent scientists are intimidated and warned that they may spoil their career prospects, if they openly opposed Einstein's relativity.'[1] Louis Essen, inventor of the atomic clock, stated that physicists seem to abandon their critical faculties when considering relativity. He also remarked: 'Students are told that the theory must be accepted although they cannot expect to understand it. They are encouraged right at the beginning of their careers to forsake science in favor of dogma.'[2] Thomas Phipps writes: 'The (politically obligatory) claim that Einstein's theories are the only ones capable of covering the known range of empirical physical knowledge is laughable.'[3]

William Cantrell identifies several reasons why Einstein's relativity theory has remained so popular:

> First, the alternative theories have never been given much attention nor taught at any university. Second, the establishmentarians have invested a lifetime of learning in maintaining the *status quo*, and they will act to protect their investment. . . . Third, Einstein's theory, being rather vaguely defined and self-contradictory by its own construction, allows some practitioners to display an aura of elitism and hubris in their ability to manipulate it. There is an exclusive quality to the theory – like a country club, and that is part of its allure. Fourth, to admit a fundamental mistake in such a hyped-up theory would be an embarrassment, not only to the physics community at large, but also to the memory of a man whose portrait hangs in nearly every physics department around the world.[4]



Some modern theosophical writers are fond of publicizing the fact that Einstein had a copy of Blavatsky's *The Secret Doctrine* on his desk.[5] Unfortunately, the presence of a *Secret Doctrine* on one's desk is not known to confer instant infallibility, even if one actually studies it! G. de Purucker took a more critical stance: 'The theory of Relativity is founded on unquestionable essentials or points of truth, but the deductions drawn in many cases by many Relativist speculators appear to be mere "brain-mind" constructions or phantasies.'[6]

Einstein and the ether

In the 19th century, scientists generally accepted the existence of a universal medium or ether, composed of a subtler kind of matter, through which light waves propagated, forces were transmitted, and – according to some theories – out of which matter was made. G. de Purucker says that the ether can be regarded as physical matter in its three highest states, beyond which lie astral, mental, and spiritual realms.[1] Blavatsky predicted back in 1888 that the ether would be rejected.[2] And indeed, in the early part of the 20th century, the ether was officially abolished by science. A prominent role in its abandonment was played by Albert Einstein.

Etheric matter cannot be detected directly by physical or chemical means. However, scientists reasoned that if the earth moves through a *stationary* ether, there should be an appreciable 'ether wind' blowing over the earth, so that the speed of light should be slightly slower in the direction of the earth's motion than at right angles to it. The first experiments to test this hypothesis were conducted by Albert Michelson in 1881 and by Michelson and Edward Morley in 1887. However, the experimental design they used failed to detect the expected ether wind of 30 km/s arising from the earth's orbital motion around the sun. Only a tiny variation in the speed of light was detected, which could be ascribed to experimental error. In the early 20th century, Morley and Dayton Miller conducted further experiments of the same type, and continued to detect a small but persistent variation in the speed of light. Whether these results are significant or merely experimental artifacts is still a matter of dispute. Later experiments have in any event demolished Miller's belief in a stationary, electromagnetic ether, and give no support to his deduction that the earth's 'absolute' motion is towards a point close to the south ecliptic pole.[3]

Michelson did not conclude that a stationary ether did not exist, but rather that the earth carries a portion of the ether along with it as it orbits the sun, so that it is surrounded by its own etheric envelope or aetherosphere. (This theory had earlier been proposed by George Stokes, and was supported by Heinrich Hertz and Max Planck.) Hendrick Lorentz put forward an alternative explanation of the Michelson-Morley experiment. He, too, retained the notion of a stationary ether, but instead of introducing the idea of ether drag, he argued that the measuring instruments used in the experiment contracted in the direction of the earth's motion by just the right amount to prevent detection of the ether (this became known as the Lorentz-FitzGerald contraction). In the first five years of the 20th century, with the help of Henri Poincaré and Joseph Larmor, Lorentz developed a theory of relativity firmly based on the existence of a fixed ether. According to the Lorentz transformation equations, as a result of motion through the ether, objects contract slightly in the direction of motion, clocks run slow, and mass increases.

In 1905 Einstein published his special theory of relativity, which dealt with uniform motion. (His general theory of relativity, dealing with accelerated motion and gravitation, was published in 1915-16.) The special theory incorporates the 'principle of relativity', which basically states that the laws of physics, when properly formulated, remain equally valid in all reference frames moving with uniform velocity with respect to each other. This principle had been formulated by Ernst Mach and Poincaré some years earlier, and was first stated by Newton. Special relativity also includes the Lorentz transformations. The famous equation $E = mc^2$ was not Einstein's discovery either; it was first published by the Italian engineer Olinto De Pretto in 1903.[4] In his 1905 paper on relativity, Einstein

acknowledged the assistance of his friend Michael Besso, who was a friend of the De Pretto family. He did not, however, include a single reference to papers by other scientists whose ideas he was trying to synthesize.

Einstein's own contribution to his radical synthesis was to abolish the ether as 'superfluous', and replace it with the idea that electromagnetic 'waves' propagate as particles (photons) through 'empty space'. Although his theory incorporated the Lorentz transformations, instead of regarding length contraction and clock retardation as effects of motion through the ether, Einstein derived them from a very different postulate, which was actually no more than an unwarranted assumption: that the speed of light measured by all observers moving at a uniform velocity relative to one another is an absolute constant.

In the context of general relativity, Einstein introduced a relativistic 'new ether', or gravitational ether. He argued that since relativity endowed space with physical qualities (the capacity to affect the behaviour of matter and energy), in that sense there *was* an ether; relativity without an ether, he said, was 'unthinkable'. However, he insisted that this ether was not composed of particles and that the ideas of rest and motion were not applicable to it; it was equivalent to his 'spacetime continuum' – essentially a mathematical abstraction, devoid of energy-substance, yet somehow capable of having physical effects. In 1938 he argued that since the conception of the ether as a mechanical substance had been disproved, 'this is the moment to forget the ether completely and to try never to mention its name'. He came to regard fields as 'physical states of space', and said, 'There is no such thing as an empty space, i.e., a space without a field'. In 1949 he wisely remarked: 'There is not a single concept, of which I am convinced that it will survive, and I am not sure whether I am on the right way at all.'[5]

Length, time, mass

In order to force the speed of light to be constant with respect to all observers, Einstein's special relativity theory tampers with space and time. This is a crucial difference between Einstein's theory and Lorentz's: according to Lorentzian relativity, the rulers and clocks we use to *measure* distance and time are affected by motion through the ether, whereas standard Einsteinian relativity claims that space and time themselves expand or contract.[1]

It took well over a decade before Einstein's theory won general acceptance and supplanted Lorentz's theory. An editorial in *Scientific American* in 1921 stated that special relativity theory

> has never been elevated to a position of any great importance in mathematical theory, simply because of itself, in the absence of its extension to the general case, it deserves little importance. It is merely an interesting bit of abstract speculation.[2]

In addition to Lorentz, other Nobel Prize winners who opposed Einstein included Planck, Michelson, Ernest Rutherford, and Frederick Soddy. Louis Essen wrote:

> Insofar as [Einstein's] theory is thought to explain the result of the Michelson-Morley experiment I am inclined to agree with Soddy that it is a swindle; and I do not think Rutherford would have regarded it as a joke had he realised how it would retard the rational development of science.[3]

When Lorentz first developed the idea of length contraction to explain the Michelson-Morley result, it struck many scientists as thoroughly arbitrary and ad hoc. Lorentz admitted that he had arrived at his equations by trial and error. It is noteworthy that no length contraction has ever been measured experimentally. What's more an object could hardly contract in its direction of motion while undergoing no changes in either of its other two dimensions.

As for time dilation/clock slowing, the 1972 Hafele & Keating experiment found that an atomic clock transported eastward around the world lost 59 nanoseconds while a clock transported westward gained 273 nanoseconds (though it has since been discovered that the 'massaged' results they published bear little resemblance to the raw data). Although the experiment is usually interpreted as verifying special relativity (SR), it actually disproved its claim that each of two observers in relative motion will find the other's clock to run slower than their own.[4] Likewise, if two twins travel separately through space at a uniform velocity in relation to one another, each will supposedly end up younger than the other! Such are the 'paradoxes', i.e. absurdities, of Einsteinian relativity. Relativists usually theorize that if only one of the twins journeys into space and then returns to earth, only *he* will age more slowly, but they hold contradictory views on why that would be the case; some invoke acceleration while others say it is irrelevant.[5] After reviewing 54 explanations, Al Kelly concludes: 'Journals appear to be hungry for any article that will support the lesser ageing of the travelling twin. It does not matter how daft are the reasons given.'[6]

Hafele admitted that moving clocks do not run slow by the amount proposed by the Lorentz transformation (the gamma factor). Contrary to SR, the slowing of clocks is a function of their velocity relative to the earth's centre of rotation. This is also demonstrated by the clocks carried on satellites forming part of the Global Positioning System (GPS). Obviously, clock slowing and the fact that the rate of radioactive decay of mesons slows down when they move at high speed do not prove that *time itself* 'dilates' or slows down; it is more logical to suppose that motion affects the internal processes of particles and atoms. All physical devices used for time-keeping are subject to error when accelerated or decelerated, or moved through gravitational fields of different strengths.

If particles are accelerated to ultra-high speeds, it becomes increasingly difficult to accelerate them further, so that they never reach the speed of light (c). Their exponentially increasing inertia as the speed of light is approached is usually attributed to the transformation of their growing kinetic energy into inertial mass. Whether their mass really increases or not is debatable; what is certain is that the total energy that has to be accelerated increases as the velocity increases, and no 'relativistic' ideas are needed to understand this.[7] Tom Van Flandern writes:

> No matter how much energy is added, the particles cannot be made to reach or exceed speed *c*. However, the same is true for a propeller-driven aircraft in level flight trying to exceed the speed of sound. The air molecules cannot be driven faster than the speed of sound; so no matter how fast the propellers are made to spin, the speed of sound can never be reached or exceeded. However, a force propagating faster than the speed of sound, or a continuous acceleration such as jet propulsion, could succeed where the propellers failed. In an analogous way, a force propagating faster than the speed of light, such as gravity, should be able to drive a body to and past the light-speed 'barrier', even though forces such as those in particle accelerators are limited to propagating and pushing at light speed.[8]

Relative motion

The relativity of space and time, and the relativity of motion are central to any theory of relativity. However, these concepts are open to different interpretations, and the interpretations offered by standard relativity theory sometimes go to absurd extremes. According to Einstein's 'relativity postulate', if two material bodies A and B are in uniform relative motion, it is equally correct to say that A is stationary and B is moving as it is to say that B is stationary and A is moving. The belief that motion is always relative to some 'arbitrary' frame of reference leads to the claim that although it may be more convenient to assume that the earth orbits the sun, it is no truer than saying that the sun orbits the earth![1] This is patent nonsense: the astronomical observations of stellar aberration of light, nutation, and stellar parallax are conclusive proof that the earth orbits the sun rather than vice versa.

Einstein's relativity postulate also leads to logical contradictions: for instance, it allows each of two clocks to work both faster and slower than the other, and the same measuring rod to be both shortened and lengthened at the same time![2] In Lorentz's theory such contradictions do not arise because he postulated a universal stationary ether, which provided an absolute standard of rest, enabling a unique state of motion to be ascribed to any object. From a theosophical viewpoint, there is no stationary, homogeneous, universal ether but rather infinite numbers of interpenetrating ethers, each of which is finite, particulate, of varying density, and in motion. There is therefore no absolute standard of rest.

But to speak meaningfully of motion, it is not even necessary to invoke the local ether as a reference frame; all that is needed is a physical reference frame or framework of coordinates that can be considered relatively stationary for practical purposes – e.g. the earth, the sun, the 'fixed' stars, etc. Tom Van Flandern writes: 'We have always known that we could use the average position and velocity of all bodies in a given vicinity as a reference frame for both position and motion. And if some velocity greatly exceeds the motion of any individual body in the vicinity, such a velocity is both detectable and has physical consequences. Only in that sense can it be called an "absolute" velocity.'[3]

Rotation and relativity

A number of key experiments have been carried out since the early 20th century which have knocked gaping holes in Einsteinian relativity theory by demonstrating that rotation is an 'absolute' state of motion that affects the speed of light (c). In 1913 Georges Sagnac, an ardent opponent of relativity theory, showed that if light beams are sent in opposite directions round a disc rotating with speed v, the beam travelling in the opposite direction to the direction of rotation travels at c+v relative to an observer on the spinning disc, while the beam travelling in the same direction travels at c-v.[1] The relativists were so shocked by this result that they dismissed and ridiculed it for nearly three decades. Einstein himself never referred to the experiment. Dean Turner comments:

> Einstein showed little disposition to recognize and credit in print the work of those scientists whose experimental and theoretical accomplishments tended to threaten the validity of his theory of relativity, and hence the basis for his public apotheosis.[2]

Today the 'Sagnac effect' is well established and has been confirmed by numerous experiments with extreme precision. In fact, it forms the basis for the modern ring-laser gyroscope, which is widely used for navigation by ships, submarines, aircraft, and satellites. In 1925 Michelson, Gale, & Pearson carried out a larger-scale experiment that detected a variation in the speed of light caused by the earth's own rotation.[3] This result, too, has since been repeated with high resolution. Attempts by orthodox relativists to explain away these findings by invoking 'time dilation' and the 'dragging of spacetime' are contrived and unconvincing,[4] and nowadays they tend to avoid any mention of them.

Planetary Sagnac experiments have also been carried out: using the GPS satellite relay system, electromagnetic signals have been found to travel at c+v from east to west and c-v from west to east, where v is the earth's spin velocity.[5] In 1979 Brillet & Hall reported a Michelson-Morley-type experiment with lasers, but 4000 times more sensitive, which again failed to detect any significant variation in light speed produced by the earth's linear motion through space; it did, however, detect a 'persistent and spurious' signal that has been shown to match the earth's speed of rotation.[6] In 2003 Wang found that the Sagnac effect also applies to straight-line motion: light generated on an object travelling in straight-line uniform motion travels at c+v against the direction of motion of the object and c-v with the direction of motion.[7]

We have seen that a null result for the Michelson-Morley experiment is consistent with the existence of a stationary ether only if the earth is assumed to drag the ether in its vicinity along with it. Depending on the assumptions made, different researchers have proposed that the aetherosphere surrounding the earth either does not rotate at all or rotates slightly more slowly than the earth itself. The experimental evidence is also consistent with a dynamic, faster-spinning aetherosphere, which causes the earth to rotate and carries it forward in its orbit around the sun, as proposed by Wilhelm Reich. Vorticular motions of ether on ever larger scales could explain the rotary and translatory motions of solar systems, galaxies, etc.[8]

Light speed

The results of the above experiments clearly contradict one of the fundamental dogmas of standard relativity theory: that the speed of light is the same in all directions and for all observers, as well as independent of the motion of the light source or the motion of the receiver. Relativity theory is also challenged by the results of experiments carried out by E.W. Silvertooth and S. Marinov, who measured a variation in the speed of light that they concluded was caused by the galactic motion of the earth and solar system in the direction of the constellation Leo.[1]

In addition to the evidence against the universal constancy of the speed of light provided by the above experiments, measurements have shown that the speed of light at the earth's surface fluctuates, and that electromagnetic radiation of different frequencies travels at slightly different speeds. However, in 1972 it was decreed that the speed of light would henceforth be fixed at 299,792.458 +/- 0.0012 km/s. From around 1928 to 1945 speeds were measured that were as much as 20 km/s lower than the present official value, but modern measurements using the GPS satellite network indicate that any variation in the speed of light can be no greater than 12 metres per second.[2]

Some ether scientists argue that light is a wave disturbance transmitted through the ether, and that the wave speed varies within certain limits according to the density of the etheric medium – the lower the density, the higher the speed. The density of the ether is

proportional to the density of any physical substance occupying the area of space concerned, and this helps to explain why on earth light travels more slowly in glass than in water, more slowly in water than in air, and more slowly in air than in a vacuum. Theosophy asserts that the speed of light above our atmosphere is faster than within it.[3] This is because the ether immediately surrounding the earth's surface is denser than the interplanetary or interstellar ether. Evidence that light slows down in denser areas of the ether, such as around large masses, is provided by the time delay that is measured when bouncing radar pulses off the inner planets.

Relativists have proposed the existence of particles called 'tachyons' which always travel faster than light. They are said to possess the following properties: their proper length and proper time are imaginary numbers (i.e. a number that, when squared, gives a negative number); their mass, energy, and momentum are imaginary numbers; their speed decreases as they absorb more energy; they can travel backwards in time. Needless to say, experiments to detect particles with these idiotic properties have all been unsuccessful.

Back in the real world, the Sagnac experiment long ago demonstrated that faster-than-light speeds are possible. In addition, charged particles can pass through an optically transparent medium at speeds greater than the speed of light in that medium, producing Cherenkov radiation. Cherenkov radiation is analogous to the shock wave (sonic boom) produced when an airplane travels through the air faster than the speed of sound. Various researchers have argued that the gravitational force must propagate many times faster than light, otherwise planetary orbits would slowly and noticeably decay.[4]

It is sometimes claimed that if something travels faster than light, it will travel backward in time. However, the direction of time is defined by the sequence of cause and effect, and since effects cannot generate their causes, the idea of time going into reverse is nonsense. If an object were to travel from point A to point B faster than the speed of light, it's true that observers at point B would *see* it arrive at B before they *see* it leave A; in fact, it would *appear* to travel backwards from B to A. This is because their observations are dependent on light, which would not be able to keep pace with the object in question. But if they could make their observations by means of superluminal signals travelling even faster than the object in question, everything would appear normal again and they would see the object move from A to B. Although it is impossible to literally travel into the past or future, it *is* possible to view clairvoyantly the images of past events imprinted on the invisible substance of nature, and the 'shadows' of probable future events that are already being cast in the present.

Space and time v. spacetime

As far as the relativity of space (or rather distance) and time is concerned, it is certainly true that the *perceived* time order and duration of events and the *apparent* distance between them depend on the observer's state of motion relative to the events in question. For instance, if we consider two events, A and B, where A causes and therefore precedes B, it is quite possible that some observers might *see* A occur at the same time as B or even after B. The unreliability of our perceptions is due to the fact that they depend on information reaching us at the speed of light. But it is going too far to claim, as Einstein did, that there is no *real* sequence of events or that the notion of simultaneity is devoid of meaning. The Global Positioning System has shown that all atomic clocks on board orbiting satellites moving at high speeds in different directions can be simultaneously and continuously synchronized with each other and with all ground clocks; no 'relativity of simultaneity' corrections, as required by special relativity, are needed.[1]

It is an axiomatic truth that all events taking place anywhere in the universe are taking place *now*, and hence all actually occurring events are simultaneous – the fact that our senses do not always allow us to observe simultaneous events to be simultaneous is irrelevant. In this sense there *is* such a thing as universal, 'absolute' time. Einstein, however, denied that a universal meaning can be attached to the notion of 'the present', saying that ' "now" loses for the spatially extended world its objective meaning'.[2] This leads to the idea that in some sense time is stretched out, like space, so that past, present, and future exist with equal status. In standard relativity theory, an object's history is described by a line drawn in four dimensions from the start to the finish of its existence; the line does not come into existence point by point. If this is taken literally, it would mean that an object cannot be regarded as located at a particular point in space at a particular point in time, that there is no such thing as a real time sequence or succession of events, and that evolutionary change is impossible.

Einstein, following Minkowski, welded space and time together into what critics have called 'the monstrosity called space-time'. In this abstract, four-dimensional continuum, time is treated as a negative length, and metres and seconds are added together to obtain one 'event'.[3] Every point in the spacetime continuum is assigned four coordinates, which, according to Einstein, 'have not the least direct physical significance'. He says that his field equations, whose derivation requires many pages of abstract mathematical operations, deprive space and time of 'the last trace of objective reality'. Four-dimensional spacetime has some rather odd features. For instance, if a light pulse travels from point A to point B, the four-dimensional distance between them is said to be zero, regardless of how far apart they are in space!

It is of course true that every event must occupy some region of space and take place during some interval of time. In this sense, space and time are inseparable. But this does not alter the fact that they are very different things and are *not* interchangeable: space is substance, ethers within ethers, whereas time is a concept arising from change and motion, and therefore from the succession of cause and effect. Strictly speaking, then, time is not an entity that 'flows', either uniformly and independent of everything else, as Newton claimed, or at different rates for different observers, as claimed by Einstein. Although 'time itself' cannot speed up or slow down, the instruments we use to *measure* time can operate faster or more slowly under certain conditions. And our own awareness of the passage of time certainly depends on our mood or state of consciousness. Time and distance are relative in the sense that 'fast' and 'slow', 'big' and 'small', 'long' and 'short', have no absolute meaning, and the instruments or processes used to measure time and distance, or to define units of time and distance, can never be absolutely unchanging.

Infinite space cannot expand or contract, or curve and warp; it can be thought of as stationary – though strictly speaking boundless space, as an abstraction, cannot be said to either move or not move. In so far as there is nothing outside boundless space for it to be relative to, it could be called 'absolute'. The noted British astronomer and physicist Herbert Dingle pointed out that Einstein's special theory of relativity, as set out in his 1905 paper, 'is concerned with concrete, observable things – clocks, instants, durations, distances, events; it is totally independent of all conceptions of the nature of space and "eternity". It treats of the relations between observable things in different "coordinate systems" ...'[4] The generalized 'conclusions' about the nature of space and time associated with Einsteinian relativity theory are the product of speculative theorizing (and poor philosophy), and do not follow from the empirical facts with which the theory deals. Although Einstein rejected the classical concepts of 'absolute' space and time, his theories sometimes assumed their existence, and combined them with the mutually contradictory concept of curved spacetime.[5]

Warped space, warped logic

There is no real evidence for the curvature of space.[1] We can speak of curved lines, paths, and surfaces *in* space, but the idea that *space itself* can be curved is meaningless unless we conjure up a fourth dimension of space for it to be curved in. G. de Purucker called the concept of curved space a 'mathematical pipe-dream'.[2] In general relativity theory, gravity is not regarded as a force that propagates, but is said to result from masses distorting the 'fabric of spacetime' in their vicinity in some inexplicable way. Thus, rather than being attracted by the sun, the earth supposedly follows the nearest equivalent of a straight line available to it through the curved spacetime around the sun. Likewise, objects on earth supposedly have weight because time bends and space warps! Clearly this abstract geometric model can in no sense be classed as an 'explanation' of gravity.[3]

General relativity is said to explain the following:

1. The gravitational redshift: Critics argue that there is no credible basis for the claim that the change in wavelength of light emerging from a gravitational field is evidence of 'time dilation'.
2. The gravitational bending of light: The bending of light rays as they pass by a massive body such as the sun in no way proves the existence of a four-dimensional spacetime continuum which is curved near a massive body.
3. Perihelion rotation: General relativity theory is said to predict the excess advance in the perihelion of the orbit of Mercury. The value of this excess advance was formerly put at about 43 arc-seconds per century, and this was also the figure calculated by Einstein, though only after he had modified his original field equations because they gave the wrong value! Unfortunately (for Einstein) the value has since been reduced slightly to 39.54 arc-seconds. Classical celestial mechanics accounts for the rest of the apsidal movement (about 5560 arc-seconds per century). Moreover, relativity theory assumes uniform curvature of space around a celestial body, and is therefore unable to explain why the orbits of the planets are elliptical in the first place, rather than perfect circles. In addition, relativity theory accounts for only one-sixth of the advance in the perihelion of Mars and cannot explain the anomalous motion of the nodes of Venus.[4]

These three phenomena can all be explained in terms of the ether. Since the density of the ether increases around large bodies such as stars and planets, it acts as a refracting medium and affects the speed of propagation of light and electromagnetic forces. Tom Van Flandern writes:

> Their behavior follows the laws of refraction for light moving through a medium of higher density: propagation slows, directions of propagation bend, and wavelengths shift toward the red. This is why ... light bends near the Sun, radar beams to the planets slow their round-trip travel times, and light escaping a gravitational field gets redshifted. The refraction model likewise can exactly predict the advance of Mercury's perihelion, as has been known since Eddington.[5]

It has been said that 'Einstein was a genius at arriving at amazingly bold and correct predictions by means of wrongheaded theories'.[6] In 1916 he predicted on the basis of his dogma of the constant velocity of light and curved spacetime that starlight passing close to the sun's limb would be bent by twice the amount predicted by Newton's theories. Observations made during the solar eclipse of 1919 were hailed by Einstein's supporters as confirmation of this prediction and Einstein became a world celebrity overnight. It is now admitted, however, that the observations were far too inaccurate to justify any such conclusion. Stephen Hawking says that the measurements were 'sheer luck, or a case of knowing the result they wanted to get'.[7] Ian McCausland comments:

> [An] unfortunate result of the announcement of the success of the eclipse observations has been an enormous hero-worship of Albert Einstein ... A result of this deification is that the greatest scorn of the scientific community is reserved for those who would try to criticize either of Einstein's theories of relativity or to suggest alternative theories, and many mainstream scientific journals reject papers critical of either theory without review.[8]

Einstein acknowledged in 1921 that 'the contrast between the popular assessment of my powers and achievements and the reality is simply grotesque'.[9]

Herbert Dingle states that although from 1904 until 1919 relativity theory was generally ascribed to Lorentz,

> with the apparent success in 1919 of Einstein's *general* theory, with its then quite new and terrifying mathematical machinery of tensor calculus, came the fatal climax. Almost overnight 'the relativity theory of Lorentz' became 'Einstein's special relativity theory', and it was immediately hailed as such by the mathematical experts. The established physicists ... gave up trying to understand the whole business, surrendered the use of their intelligence, and accepted passively whatever apparent absurdities the mathematicians put before them. They had the seeming excuse that the mathematical equations worked.[10]

Pari Spolter characterizes relativity theory as 'science fiction or pseudoscience'. She writes: 'Mathematics, which is the most advanced science, should be used to analyze observations and experimental data. It should not be used to create a new physical science based on hypothetical equations.'[11] Al Kelly comments: 'Relativity theory has assumed the status of a religion whose mysteries are to be believed without question. For how long can nonsense stave off common sense?'[12]

It has been shown above that standard relativity theory is illogical and contradictory; it interprets the relativity of time, space, and motion in a way that denies any objective, universal reality behind our imperfect observations; it claims that the speed of light in our own particular world is an absolute constant and represents an absolute speed limit throughout universal nature; it fails to recognize that space must be infinite, and that the range of scale of the worlds and beings composing it must likewise be infinite; and it ignores the possibility of inner worlds composed of nonphysical states of energy-matter.

Unification

Einstein did not regard general relativity as a 'final' theory. He was well aware of the contradiction between quantum theory (with its discontinuous quanta) and relativity theory (with its continuous fields). He spent the last 40 years of his life attempting to extend the geometrical notions of general relativity to include electromagnetic interactions, and to unite the laws of gravitation and the laws of electromagnetism in a unified field theory. Many other mathematicians also worked on this subject, and some of these theories introduced a fifth dimension. Although none of these attempts was successful, the desire to develop a unified theory continues to motivate many contemporary scientists.

Theoretical physicist Stephen Hawking, who is supposed to be the greatest scientific 'genius' since Einstein, prophesied that a completely unified theory of the universe – a theory of everything – might be found by the end of the 20th century! John Gribbin, a popularizer of scientific orthodoxy, declared in 1986 that the dream that science might one day be able to explain the origin and evolution of life and the universe in one grand package is all but fulfilled, and that metaphysics is therefore dead and metaphysicians are out of a job![1]

Some scientists believe that superstring theory is a major step towards a theory of everything. String theory 'seeks to unite space, time and matter, and to build all of them from the vibrations of submicroscopic loops of invisible [one-dimensional] string inhabiting a ten-dimensional imaginary universe'![2] In this theory, which is without any empirical foundation, the six extra spatial dimensions are supposed to have shrivelled up into 'wormholes' a billion-trillion-trillionth of a centimetre across. Such ideas indicate how surreal, if not grotesque, pure mathematical speculation can become. As G. de Purucker remarks:

> scientific theory and speculation in certain respects are becoming so highly metaphysical that they not only are beginning to merge at certain points with the teachings of the esoteric philosophy, but in some instances are actually crossing these teachings and going off at a tangent.[3]

The unification of physics will never be achieved by mistaking mathematical fictions for reality. Genuine progress requires a serious effort to investigate and understand the ether, which is the unifying factor behind all physical manifestations of matter, force, and energy, including a series of neglected anomalies. In 1941, Wilhelm Reich brought such an anomaly to Einstein's attention ...

Einstein v. Reich

Reich discovered a universal form of nonelectromagnetic, etheric energy – which he named 'orgone energy'. He showed that it could be detected optically, thermally, electroscopically, and by means of radiation counters, in the atmosphere, the soil, living systems, and in a vacuum. He found that it could be concentrated in metal-lined enclosures, or orgone accumulators (ORACs), and that the orgone concentration could be increased by surrounding the inner metal box with several alternating layers of conductors and insulators.

In early 1941 Reich had two meetings with Einstein to discuss his finding that the temperature above the top of an ORAC was significantly higher (by up to 2°C) than in the ambient air. Einstein reacted by saying that, if reproducible, this thermal anomaly would be 'like a bombshell in physics'. This is because according to the second law of thermodynamics, heat energy is only supposed to dissipate – not spontaneously accumulate. Reich left an ORAC with Einstein so that he could carry out the measurements for himself. A week later Einstein wrote to Reich saying that he had confirmed the temperature difference. But, on the advice of his assistant Leopold Infeld, he dismissed the phenomenon as an *artefact* caused by normal indoor convection currents. Reich responded by carrying out further experiments to refute this trivial 'explanation', but for Einstein the issue was closed.

During the next 60 years, the experiment remained unmentioned by conventional physicists. Several 'Reichians' successfully repeated the experiment, but never under sufficiently stringent conditions. However, a rigorous repetition of the experiment was reported by Canadian scientists Paulo and Alexandra Correa in 2001. They have verified that even under the most disadvantageous conditions, a small but significant thermal anomaly persists, pointing to the existence of an anomalous flux of nonthermal energy.[1] They conclude:

> Thereby, Infeld's objection is shown to be facile, and Einstein's oscillation between his enthusiasm for Reich's explanation and his hasty acceptance of this facile objection leaves us with the sensation that Great Men are only the idols of Little Men.

Einstein once declared that classical thermodynamics would 'never be overthrown'. Ironically, the theory was overthrown right under his nose but he was blind to the evidence.

Yet while Einstein was canonized, Reich was persecuted and branded a crank. In 1956 the Federal Food and Drug Administration obtained a court injunction which ruled that orgone 'does not exist', that all books and journals containing detailed discussions of orgone should be destroyed, and that related devices should be dismantled or destroyed. The FDA proceeded to incinerate all of Reich's books mentioning orgone – just as the Nazis had burned his books in the 1930s. Reich was later imprisoned for contempt of court, and died in jail in 1957. The FDA continued to burn his books until the early 1960s.

Future science

Building on Reich's pioneering experimental and theoretical work, the Correas have developed a detailed model of a dynamic ether. They have also developed technological applications, such as their patented over-unity Pulsed Abnormal Glow Discharge (PAGD) electricity-generating reactors, and their self-sustaining aether motor, which can even operate by drawing bioenergy direct from the human body. Like various other researchers, they have also demonstrated that gravity can be controlled by electromagnetic means.

Eugene Mallove has witnessed and examined some of the Correas' remarkable discoveries and inventions, and writes as follows about the proposal of a universal energetic ether:

> this is not all that much more than mainstream physicists claim when they speak of cosmic 'dark matter,' 'dark energy,' 'quintessence,' or the like comprising the vast bulk of the universe. The main difference is that the Correas provide concrete, falsifiable, table-top experiments to bolster their claims. In the tradition of Einstein's famous 'gedanken' [thought] experiments that so set back physics, Theory-of-Everything speculators today in mainstream physics pose ever more esoteric mathematical sand castles (*e.g.* string theory), almost none of which can be checked with experiments.[1]

Since the second half of the 19th century, many researchers have developed 'free-energy' devices of one type or another.[2] While some researchers are looking to the ether for an explanation, others prefer less radical solutions, such as the electromagnetic zero-point field or vacuum energy postulated by quantum theory. However, the ZPF cannot explain the types of anomalies being investigated by the Correas and others; these point to a subquantum, nonelectromagnetic energy continuum – the ether.

Once mainstream scientists have managed to kick their current addiction to irrational mathematical abstractions, the study of the ether will keep them busy for many millennia to come. But contrary to what some ether scientists may believe, even the ether of physics is not the 'bottom level' of reality – but merely a bridge to the deeper realms of spirit-substance that lie beyond.

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